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Inventor MARCUS, Rudolph J.

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Navy Case 66787

METHOD OF REDUCING BIOLUMINESCENCE EFFECTS CREATED BY OBJECTS
MOVING THROUGH SEAWATER

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Background of the Invention

1 The present invention relates to the method of reducing biolumi-
nescence effects created by objects moving through seawater and more
particularly to the method of reducing bioluminescence effects created
5 by objects moving through seawater by reducing either the necessary
friction or changing the liquid environment necessary for marine organ-
isms to bioluminesce.

The ocean surface in many parts of the world and especially in
the tropics is dense with single-celled luminous planktonic organisms,
10 primarily dinoflagellates, that glow when stimulated mechanically,
as by the churning of the waves, or, when washed ashore, by the pressure
of a foot of a person walking on the beach. Objects moving through
the ocean surface in areas where these organisms are present provide
sufficient friction to cause the planktonic organisms to glow. This
15 glow creates serious problems of detection of ships or divers moving
through the water.

Also, the light-emitting part of the organisms is more acid (pH
about 5.7) than is seawater (pH about 8).

The problem of the presence of the bioluminescence especially
20 caused by the deployment of ships makes their presence more detectable
especially by photodetecting means and by visual observation.

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Summary of the Invention

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The present invention provides for a method of reducing or eliminating the bioluminescence effects created by objects moving through seawater containing marine organisms that luminesce in the presence of friction thereby creating effective countermeasures against being detected. The method includes the steps of ascertaining the presence of the luminescent marine organisms, injecting a sufficient drag reducing agent in the area of friction caused by the object moving through the seawater or in the alternative injecting an alkaline solution to neutralize the acidic state of the surrounding fluid in order to protect the marine organisms from luminescing; and to continue the dispensing of either the drag reducing agents or the alkaline solution until the potential bioluminescence threat is terminated.

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Accordingly, an objective of the invention is the provision of a method for the reduction of the bioluminescent effect created by marine organisms that are sufficiently agitated by objects moving through the water wherein they reside.

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Another objective of the invention is the provision of a method of reducing the bioluminescence emitted by marine organisms by the injection of a friction reducing agent at the interface of the object moving through the water and the marine organisms.

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A further objective of the invention is the reduction of bioluminescence effect of ships passing through water containing bioluminescent marine organisms by the injecting of drag reducing agents into the bow wave of the ship.

1 Still another objective of the invention is the provision of
injecting alkaline fluid into the bow wave of a ship to prevent marine
organisms that would normally luminesce from luminescing as a result
of the acidity of the surrounding liquid in which they reside.

5 These and other objectives of this invention will become apparent
from the following detailed description.

Detailed Description

The method of the present invention comprises spraying or inject-
ing into the water, through which the objects must move, drag reducing
10 agents. The drag reducing agents may be added to the body of the water
in the form of an aqueous solution or suspension. Some typical drag
reducing agents and their application are disclosed in U. S. Patent
number 3,230,919. According to the present invention, the drag reduc-
ing agents reduce friction between the moving object and the water in
15 which it moves and thus reduces the intensity of friction-stimulated
bioluminescence.

The method of the invention is applicable to all water craft
as well as to divers or swimmers that may be in the water. As will
be apparent to those skilled in the art, the benefits of the invention
20 are particularly beneficial in the prevention of the detection of ships
while operating in an area under which they may be under surveillance.
By reducing or eliminating the bioluminescence effects, visual sighting
of the bioluminescence effects or the detection by electro-optical
means will be essentially eliminated.

1 Alternatively, instead of the introduction of drag reducing agents
like those mentioned in the above referenced patent, the present inven-
tion also comprises the introduction of alkaline solutions into water
ahead of the moving objects, or water in which a portion of the object
5 must move. Alkaline solutions suitable for use are solutions of sodium
hydroxide, potassium hydroxide, ammonium hydroxide and calcium hydrox-
ide. The concentration of the alkaline solution to be injected must be
such as to raise the pH of a thin layer of water between the boat and
the water from 5.7 to 8 or higher thus preventing bioluminescence from
10 occurring.

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Abstract of the Disclosure

↪ Once the presence of bioluminescence marine organisms are present in the water through which ships or divers will be operating, a drag reducing agent or an acid neutralizing agent is injected into the water.

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This substantially eliminates the bioluminescence effect. ↪